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QUARTERLY REPORT

July 17, 1979

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APPLICATIONS OF HCMM DATA

TO

SOIL MOISTURE SNOW

AND

ESTUARINE CURRENT STUDIES

(E79-10248) APPLICATIONS OF HCMM DATA TO  
SOIL MOISTURE SNOW AND ESTUARINE CURRENT  
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#### A. Problems

With the power stablization of the HCMM spacecraft and the receipt of 32 images since March 22 (22 images since June 1 alone), most of the problems cited in the past quarterly report have been alleviated. Tape orders now take 4 to 6 weeks to be filled, not unusually along; but a shorter turn-around time would be appreciated.

#### B. Accomplishments

The data collection platform (DCP) has been received from La Barge, Inc. Work is proceeding on interfacing the DCP with the electronics from the soil moisture gauge. Completion, including installation as well as calibration of the gauge is still on schedule for October 1979.

On Wednesday June 13, 1979, HCMM passed over the Luverne test site on a night/day sequence (0803GMT & 1858GMT respectively). A major data collection effort was carefully planned in conjuction with the HCMM overpasses. The effort involved the cooperation of personnel from NESS and NWS's Office of Hydrology, NASA/JSC and USDA/Soil Conservation Service. Limited ground data, 6 locations only, were collected with predawn overpass. These data included 10-cm (4-inch) soil samples, surface temperatures, and 10-cm temperatures. Extensive ground-based data were collected during the day. Over 60 soil samples and 30 sets (surface and 10-cm depth) of soil temperatures were obtained by two, two-man teams between 1600 GMT and 2200 GMT.

Meanwhile, four satellites collected data over the test site: NASA's Heat Capacity Mapping Mission (HCMM) satellite and Landsat-2 and the NOAA-operated TIROS-N and SMS-2 satellites.

Aircraft from NASA and NOAA collected data in the visible and Thermal-IR and gamma-ray portions of the spectrum respectively.

Receipt of aircraft and satellite data is not expected for several months, however preliminary compilation of the ground data is completed and will be included in the next report. Initial plots of the raw daytime soil moisture and temperature data are found in figures 1-6. The surface temperatures, figure 1, appear to vary almost randomly, mostly between 31 and 44°C. Those at the 10-cm depth, figure 2, have a more restricted range (18 to 25°C). A large portion of the surface temperature variation is due to diurnal effects (temperatures were collected from 11 am (1600GMT) to 5 pm (2200GMT) local daylight time). Except for one soil moisture value at 43.5 percent, the moisture content of the samples are clustered near 26 percent ranging from 22 to 30 percent (figure 3). Figures 4 and 5 show that there is little correlation between soil moisture and temperature whether at the surface or at 10-cm depth. Figure 6 summarizes the data by displaying square mile (section) averages.

Additional analyses of the ground data will consider the diurnal variation of the surface temperature. Further evaluation of the data will be postponed until receipt of aircraft and satellite images and tapes.

John Pritchard of the NESS Computation Group, has developed a program that produces a rectified 1:250,000-scale computer printout of a HCMM tape that corresponds well with a standard USGS map at the same scale. Figure 7 shows one such example showing a portion of the lower Potomac River (marked as W's).

C. Significant Results

None

D. Publications

None

E. Recommendation

None

F. Funds Expended to Date

Balance of funds	1.5 K
Spent this period	<u>1.2</u>
Funds remaining	0.3 K

G. Data Utility

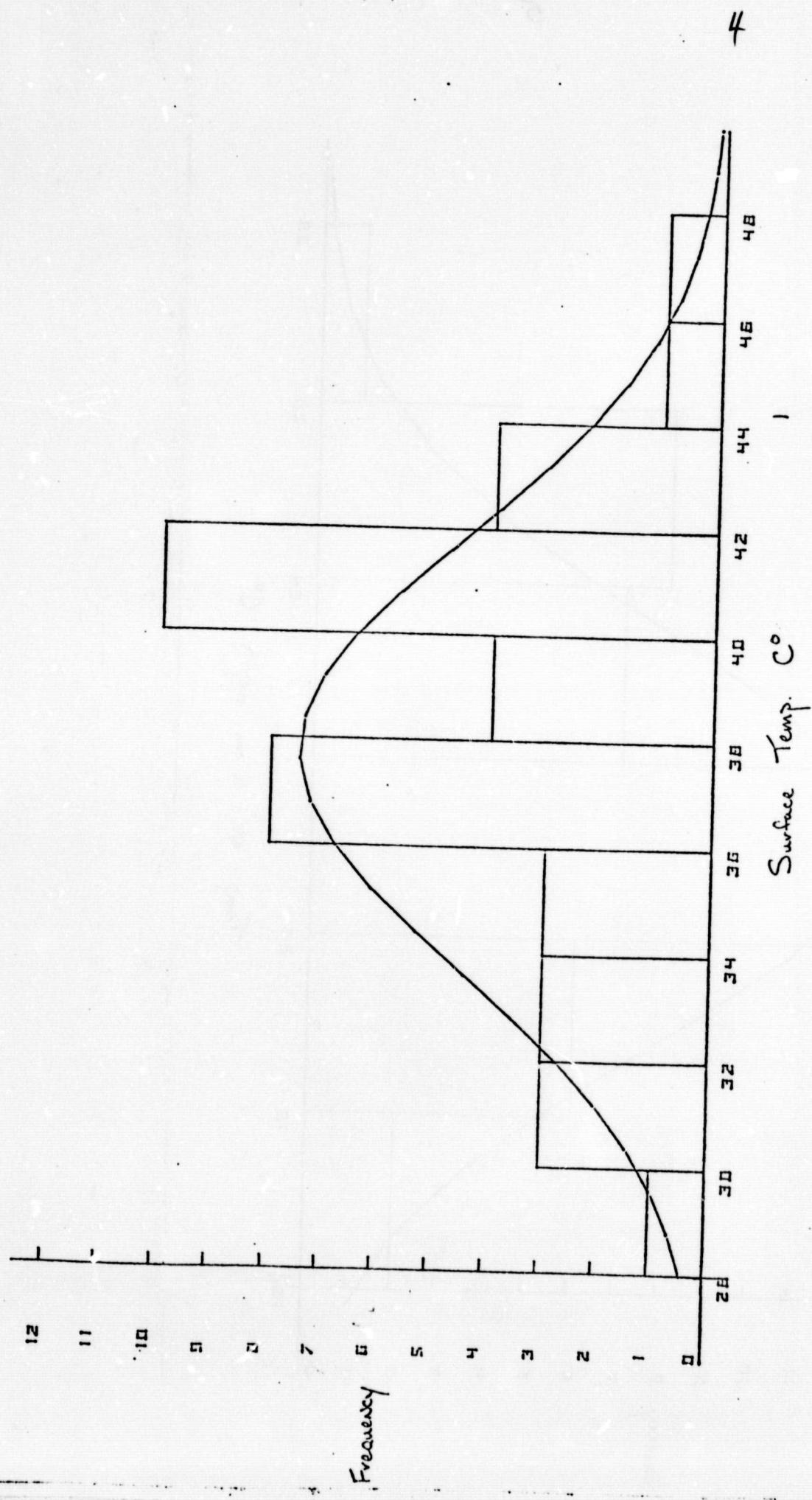
Positive transparencies and prints are of good photographic quality but suffer a limited dynamic range of gray scale whenever bright clouds are present (visible only). Tapes for 2 scenes ordered, one received and of good quality.

H. Future Plans

Our major effort during the next quarter will be centered on the 6/13/79 Luverne data set. HCMM images received will be examined and CCT's ordered for those scenes determined to have useful information for our studies.

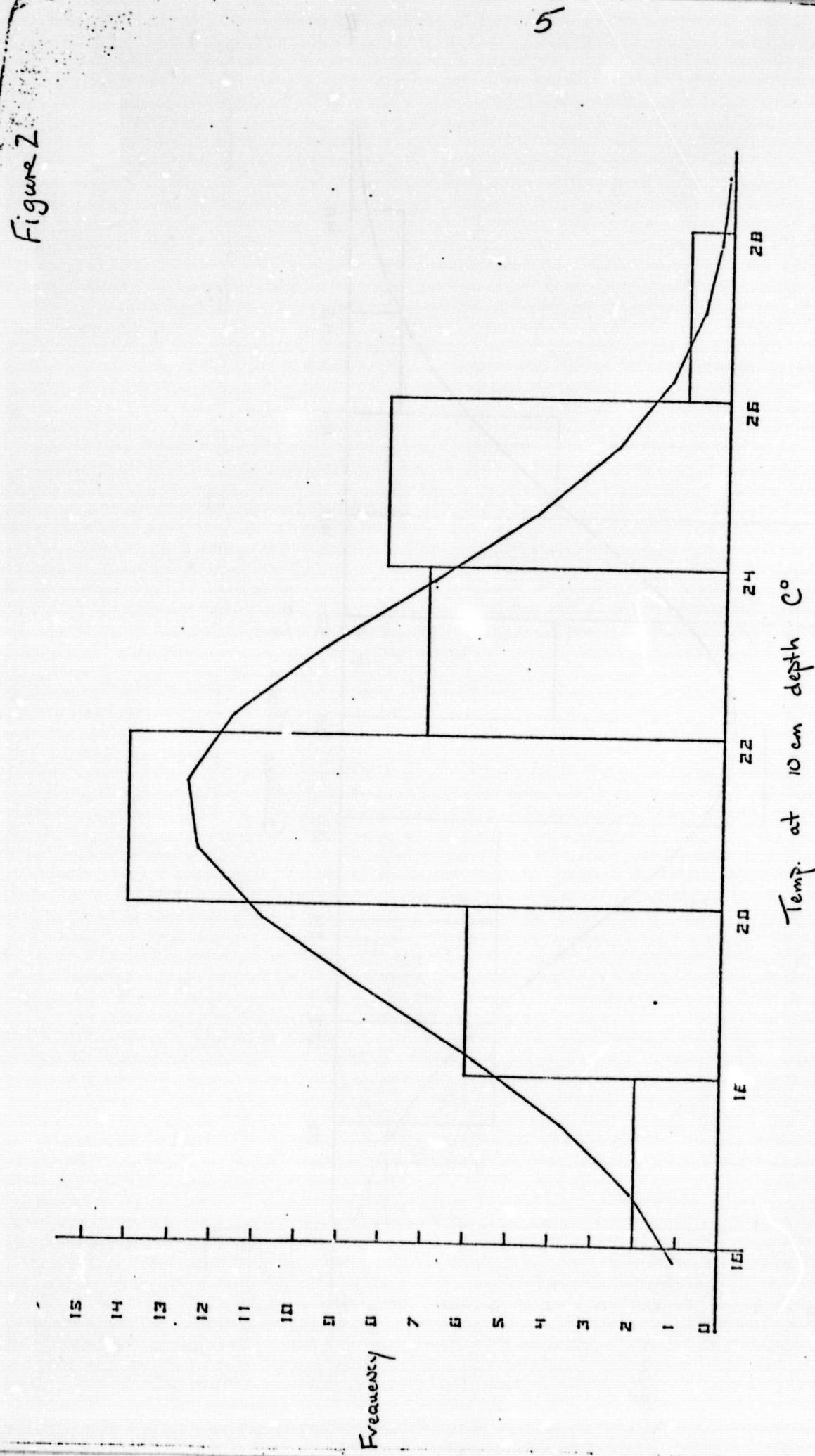
June 13, 1979 (day)

Figure 1



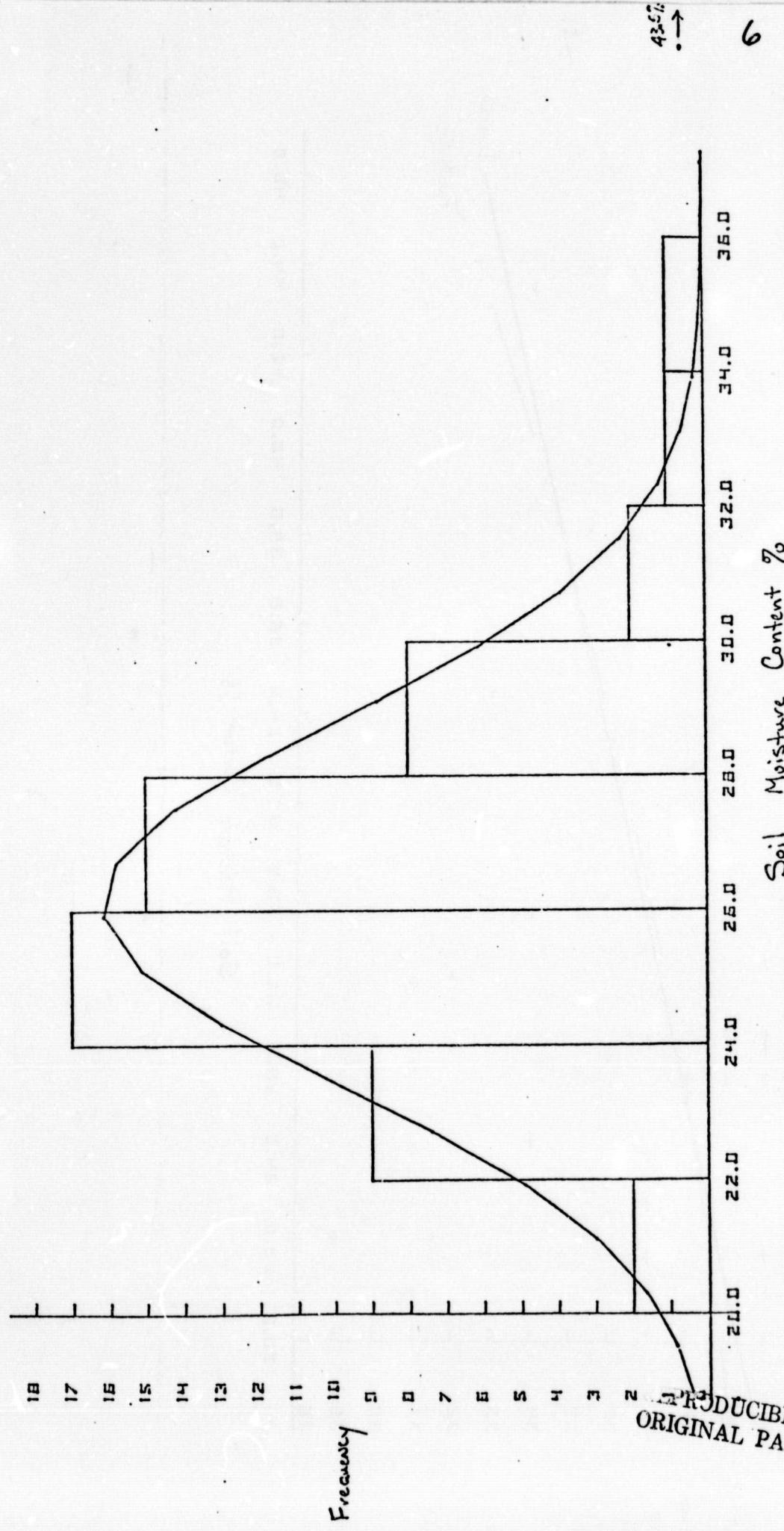
June 13, 1979 (day)

Figure 2



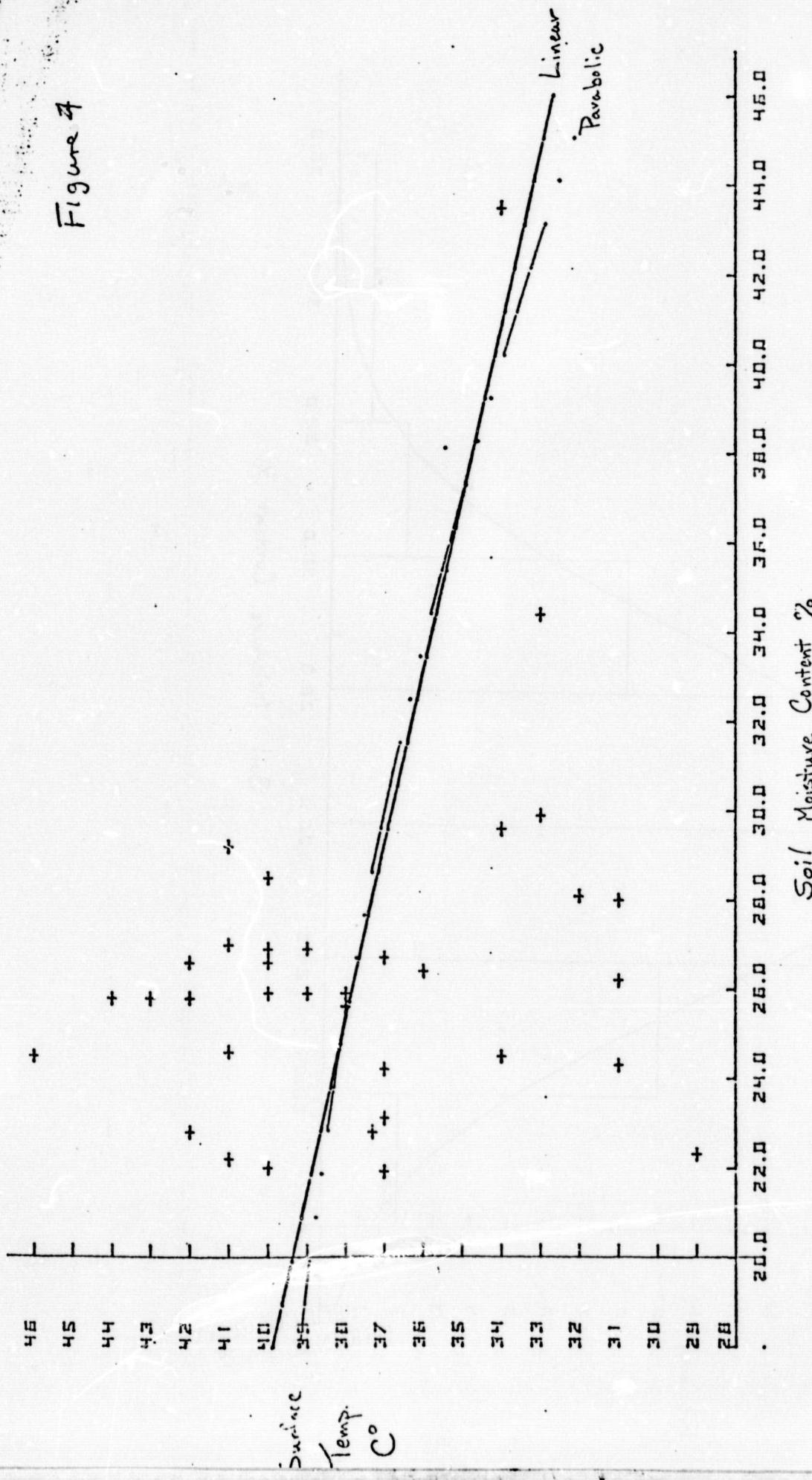
June 13, 1979 (day)

Figure 3



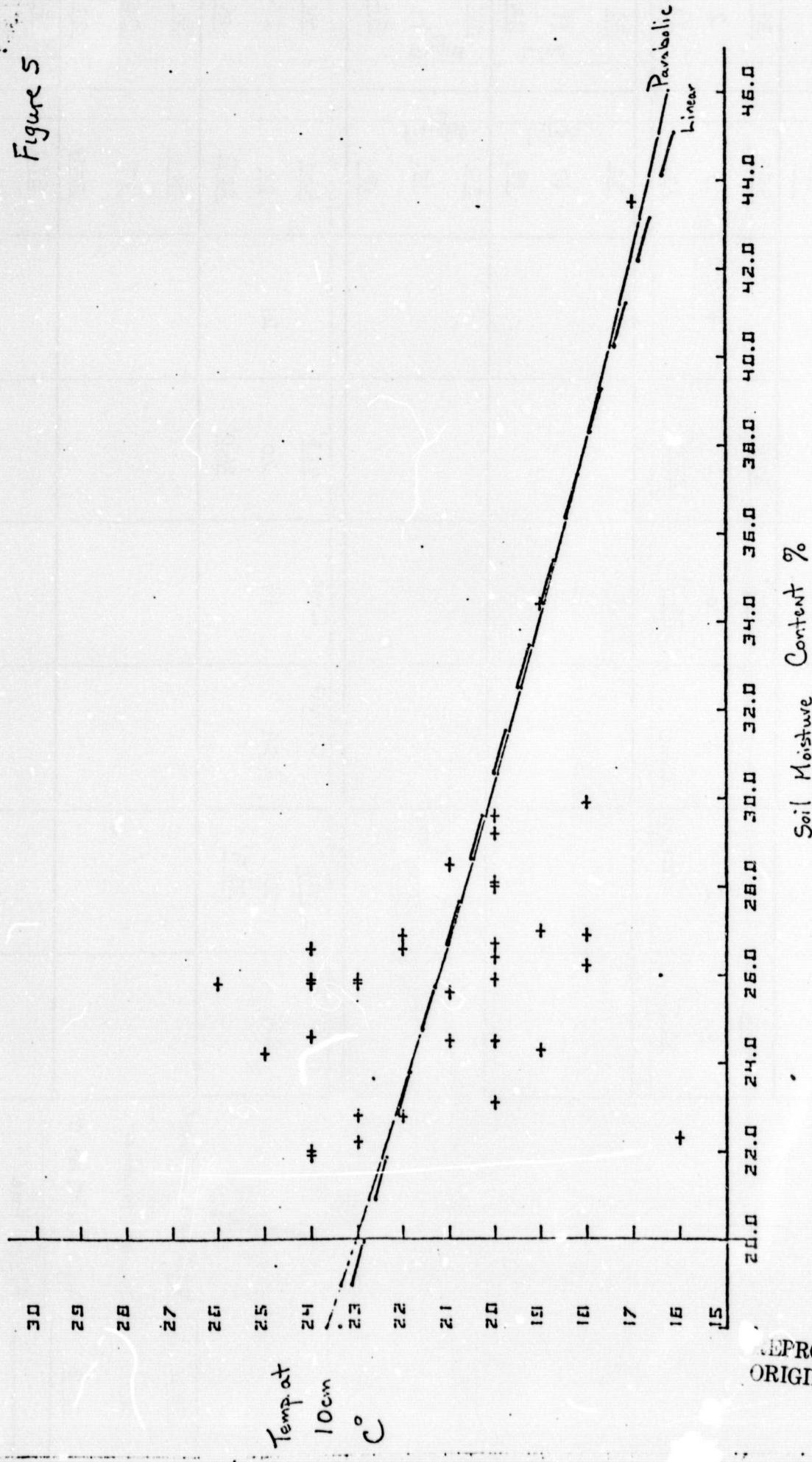
June 13, 1979 (day)

Figure 4



June 13, 1979 (May)

Figure 5



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June 13, 1979 (day)

2 ——————

Avg. Surface Temp.  $6^{\circ}$

### Section Number

Avg. 10cm Temp C°

### Flight line

294 only one value recorded

111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304

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